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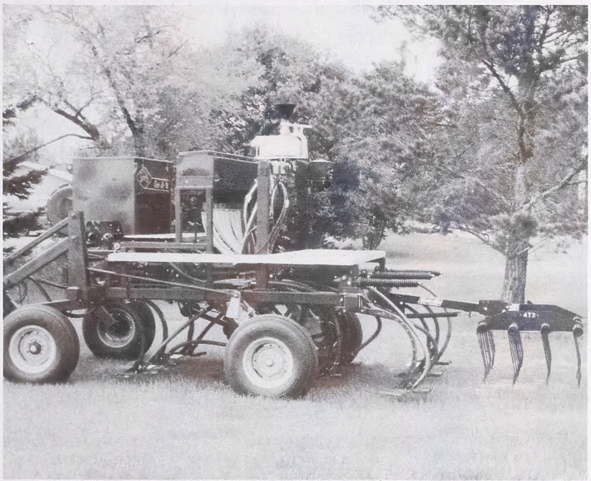
THE ENGINEERING IN AGRICULTURE NEWSLETTER

Plot Air Seeder

Lawrence Papworth, Project Engineer, AFMRC, Lethbridge

The Alberta Farm Machinery Research Centre (AFMRC) designed and built a plot air seeder for use in determining the amount of fertilizer that can be safely applied by air seeders at different seed band widths. The Soil and Crop Management Branch of Alberta Agriculture, Food and Rural Development is coordinating the project. Several commodity groups and fertilizer companies are also participating. Most of the parts and equipment for the air seeder were donated by farm equipment manufacturers.



The plot air seeder was designed to penetrate heavy soils, yet clear high amounts of residue. The unit conisists of a two metre wide, four row, floating hitch cultivator with two delivery boxes and a metering cone mounted above the frame. Spacing of the shanks can range from 200 to 300 mm.

The seed boots were designed and developed with the use of the Alberta Soil Bin Test Facility. They can spread material in 20, 50, 100 or 150 mm widths and are spring loaded onto the shanks to prevent damage in stony field conditions.

Engineers Use An Indoor Soil Bin To Test Ground Openers

Lawrence Papworth, Project Engineer, AFMRC, Lethbridge

The Alberta Soil Bin Test Facility, a cooperative venture between the Alberta Farm Machinery Research Centre and Agriculture Canada, has completed its first year of operation. It is being used to assist manufacturers and researchers to develop and evaluate soil openers for the current generation of air seeders and drills.

The test facility consists of a bin 58 feet long, 10 feet wide and 2 feet deep that is fitted with a tool and instrument carriage. The instrument carriage is mounted on rails and is pulled along the bin by a

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AGRICULTURE, FOOD AND
RURAL DEVELOPMENT
Engineering Services

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The purpose of this newsletter is to advise of activities and projects being conducted by Alberta Agriculture, Food and Rural Development's Engineering Services and Regional Agricultural Engineering staff. For further information on these projects and other engineering related activities contact:

Lethbridge	381-5112	Airdrie	948-8537
Red Deer	340-5322	Vermilion	853-8224
Barrhead	674-8253	Fairview	835-2291
Edmonton (Eng. Services)	427-2181	Lethbridge (AFMRC)	329-1212

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large electric motor. The speed of the carriage can be controlled between 0.75 and 7.5 mph. The carriage has an adjustable frame upon which various tillage tools can be mounted. Vertical, lateral and horizontal forces, speed and position are measured and recorded as the tool moves through the soil. The carriage has a metering system for the distribution of seed and fertilizer. Delivery can be provided by either an air or gravity feed system. To recreate soil resembling a field condition, the system also contains equipment to loosen, mix, level, compact and add moisture to the soil.

A major project currently underway is the evaluation of double shoot openers. Seed and fertilizer placement and soil forces were measured for thirteen different openers.The evaluation also includes field testing which began last fall and will continue in 1994. Wear tests on the openers will be done in a circular soil bin, currently under construction at the Alberta Farm Machinery Research Centre.

Dehydrated Silage ... A Feed Alternative?

Marshall Eliason, Farm Machinery Engineer, Edmonton

In a continuing effort to reduce forage losses, Engineering Services, in conjunction with Agriculture Canada, is investigating the physical and nutritional benefits of a new form of feed. During the last few years, many areas of Alberta were drenched with rain storms during the forage harvesting season. Millions of dollars were lost due to spoiled or over ripe hay crops. Many silage producers were able to avoid these losses since silage is harvested shortly after cutting. Based on this advantage, Engineering Services is trying to determine if silage can be processed into a dry, compact and nutritious feed product.

For this project, silage was dehydrated in a drum dryer to determine the optimum drying temperature. Using the dried silage, feed trials were then conducted to determine feed intake and digestibility. Additional work will be done to evaluate a suitable packaging system to enable convenient and efficient export shipments. (For more information, contact Marshall Eliason at 427-2181.)

Measuring The Number Of Times A Cow Chews

Robert Maze, Project Engineer, AFMRC, Lethbridge
Giang Truong, Electronics Technologist, AFMRC, Lethbridge

Working with Agriculture Canada, an Engineering team at the Alberta Farm Machinery Research Centre (AFMRC) has developed a method for measuring the number of times that a cow chews. Why you might wonder? Agriculture Canada in Lethbridge is conducting a study on the eating and ruminating habits of dairy cows.

The chew counter is a sensor made of a low cost piezoelectric foil which is mounted onto a spring steel base. It is then fitted onto a halter and placed underneath the cow's jaw. A voltage output is produced whenever pressure is applied to the jaw (i.e. chewing). The sensors cost $3.00 each and have held up well to their unique task.

Using Conventional Drills To Seed Peas and Beans

Robert Maze, Project Engineer, AFMRC, Lethbridge

An attempt is being made to expand bean production in southern Alberta. To assist, the Alberta Farm Machinery Research Centre (AFMRC) has completed a research project to find out if conventional planters can be used to seed peas and beans. An air seeder, an all till drill, a discer, a hoe drill, a press drill and two precision planters, were used to plant under tilled and direct plant conditions.

Cool, wet weather conditions caused large variations within the bean plots. This made it difficult to draw conclusions about differences between the machines used for planting. However, insight into weed control, seeding rates and harvest problems was gained from the abnormally rainy conditions.

The Radley pea plots showed exceptional germination rates and yields using all the tested drills. The press drill performed the best in tilled soil yielding 4,110 lb/ac. while the air seeder yielded the best results in the direct plant conditions with 4,580 lb/ac. The one inescapable conclusion was that 1993 was a good year to grow peas rather than beans in southern Alberta.

Electronic Information Superhighway

Murray Green, Farm Machinery Engineer, Airdrie

The "Electronic Superhighway" is a term used for the futuristic electronic communication system under development in the United States. The Highway is all the cables and wires upon which communications can take place. But what communications are we talking about? By someone's recent count, there are more than 40,000 computer networks and bulletin boards that can give us a vast amount of information. Some people call this a maze of cyberspace. Cyberspace is the invisible world in which electrons buzz around inside your computer and out to other computers.

Alberta Agriculture, Food and Rural Development foresees the need for an electronic information system being available to the agriculture industry. A project is under way to create the communication links for such a system in Alberta. This will allow people to increase the usefulness of computers for managing farms and agri-businesses.

People will not only be able to obtain production, marketing and weather information, but also communicate with other farmers, farm suppliers, and agricultural specialists. They will be able to buy and sell farm inputs , pay bills , receive payments to their bank accounts and run analysis programs to test a theory before they apply it to their farm. In fact, if you want to do it, what ever "it" is, you can!

Predicting Natural Ventilation

Robert Borg, Regional Engineer, Red Deer

Natural ventilation depends on the wind. Animals in these naturally ventilated barns often grow faster due to better summer ventilation. Costs are also reduced because you don't need electricity to run ventilation fans. The problems facing engineers are: how big do you make the openings in the side walls and what direction do you place the barn to take advantage of local wind conditions? A computer program, NATVENT, developed by Yves Choinière in Ontario, can help. By utilizing 30 years of local weather data, it will calculate the air flow based on barn geometry and orientation.

To see if the model would work in Alberta, the Engineering Services Branch sponsored a project with the University of Alberta during the summer of 1993. Two barns were chosen. The first was an older swine finisher barn located in an open field near Lacombe. Here, wind could blow through the barn from all directions. The second was a new finisher barn at Olds College that was sheltered from northwest, west and southwest winds. NATVENT predictions were very accurate for the open field and within 25% for sheltered barns. Based on these results, we are quite confident that the model can help us design barns that completely depend on the wind for ventilation.

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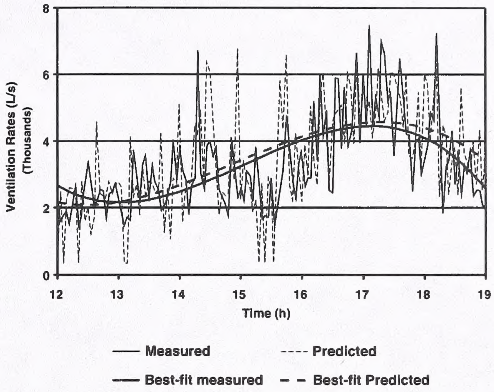

Lacombe swine barn - open field conditions

Information Technology
.... Planning For The Future

Dave Scott, Systems Engineer, Edmonton

The Engineering Services Branch of Alberta Agriculture Food and Rural Development relies on computers for much of its work. This includes such activities as designing and testing machinery, wind tunnel and soil bin research, building design and analysis, data analysis, as well as wordprocessing, graphics and program presentation. The growing needs for the branch are in communications and emerging technologies such as Global Positioning Systems (GPS) and Geographical Information Systems (GIS). Planning and management will allow engineers to efficiently provide services and technology to the agricultural industry.

The Engineering Services Branch is presently

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developing an Information Technology (IT) Plan to support the implementation of its Strategic Plan. The purpose of this plan is to provide a development framework for the effective and efficient use of its computer system. The objectives of the plan are to:

- advance the engineering initiatives of the department's business plan
- minimize the cost of electronic equipment
- ensure that computers and software are up to date to meet client needs

Most of the components of the plan are expected to be in place by April, 1994.

Pickett Bean Planter Evaluation

Robert Maze, Project Engineer, AFMRC, Lethbridge
Tony Pickard, Technologist, AFMRC, Lethbridge

The Pickett Bean Planter, manufactured in Burley, Idaho, has been evaluated at the Alberta Farm Machinery Research Centre.

The testing found the machine to have a large seed carrying capacity and the ability to plant at a speed of 8 kmh. The bean planter has an unusual meter design with internally fluted rollers rather than the common precision metering system. The planter uses a disk behind each seed row to hill 6 cm of soil over the seed row. The manufacturer claims this improves the movement of moisture upwards toward the seed. However, this was not part of the test. The Pickett Bean Planter did not do well in some stony test fields. A number of recommendations toward improving rock clearance will be made to the manufacturer.

The evaluation report on the Pickett Bean Planter will be available this spring.

Alberta Events '94

Farm Machinery Electronics Workshops

March 18	*Beaver Lodge*
March 21	*Athabasca*
April 8	*Bonnyville*

Combine Clinic and Information Day

March 28	*Grande Prairie*
March 29	*Falher*
March 30	*Vegreville*
March 31	*Olds*

Direct Seeding Demonstration Days

May 31	*Donnelly*
June 2	*Killam*
June 7	*Fort Saskatchewan*
June 9	*Strathmore*

ILO Committee Back On Track

Brian West, Waste Management Engineer, Red Deer

The major commodity groups in Alberta see themselves taking a greater role in promoting member environmental awareness and education. The basis for this awareness is the new "Code Of Practice For The Safe And Economic Handling Of Animal Manures".

After a few setbacks, the Intensive Livestock Operations Committee is back on track. At the request of the provincial government, all the major commodity groups, in cooperation with government agencies, are again resolved to creating a consistent development planning approach for the livestock industry. This approach is based on sound manure management practices which emphasize the integration of livestock, soils, and crop systems. Provincial agricultural engineering expertise will provide technical support to development officers to assist them in making sound planning decisions.

A schematic of the development planning process is shown below. Engineering expertise is required at two stages. The first occurs at the Management Plan stage where assistance may be necessary. The second occurs at the Municipal Screening stage where technical support will be provided on a referral basis to assist environmentally sensitive development applications.

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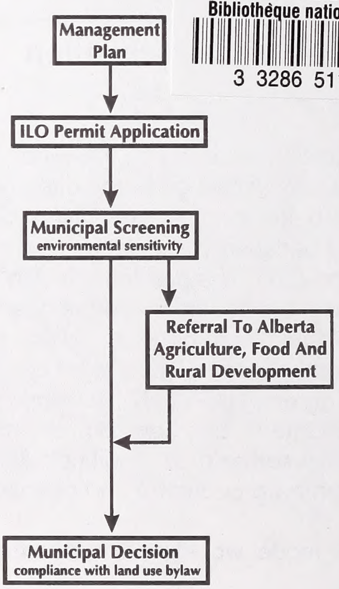
Management Plan
ILO Permit Application
Municipal Screening
environmental sensitivity
Referral To Alberta Agriculture, Food And Rural Development
Municipal Decision
compliance with land use bylaw